

US Nuclear Regulatory Commission
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Subject: Annual Report for the Rensselaer Polytechnic Institute Reactor
Critical Facility (RCF). NRC License CX-22, Docket Number 50-225.

Dear Sirs,

The RPI Reactor Critical Facility (RCF) operated successfully over the period fall 2001 - spring 2002. During this period, The RCF was used for courses and for two Masters theses. In addition, a total of twelve credits of PhD thesis work were carried out at the RCF. This document constitutes the current Report of the Rensselaer Polytechnic Institute's Reactor Critical Facility (RCF) to the USNRC, USDOE and to RPI management.

Work proceeded on critical experiments with the 0.640 pitch lattice plates, the last of the three sets of lattice plates provided by USDOE contract. The results of experiments with SPERT(F1) fuel and with ABBCE fuel are being analyzed for publication. The SPERT(F1) fuel is 4.81w/o enriched high density UO₂ pellet fuel clad in stainless steel, so it is similar to power plant reactor fuel. Until 1986 the RCF fuel was highly enriched metal plate fuel, so it was similar to naval reactor fuel. The RCF is now the only facility in the U.S. carrying out reactor physics critical experiments in support of the power reactor function. These experiments are similar to power reactor startup measurements. A PhD thesis experiment is underway to measure the penetration of fission gammas through fuel pin lattices without water; the application is to above-ground cask storage of spent fuel and to fuel handling devices. A Masters thesis examined large reactivity additions potentially resulting from fuel rearrangements in a terrorist situation. A second Masters

A001
A020

thesis developed a technique for reactor power measurement based on detecting core gammas outside the reactor tank. Work continues on upgrading the reactor instruments, circuits, readouts, and facilities.

The RCF continued to share the facility with visiting groups, with a total to date of 1036 individuals from participating organizations examining the RCF, operating it and carrying out a reactor physics experiment. The visitors also learn about the radiological and nuclear safety of the reactor, its regulation by the USNRC and its relation to civilian, naval and research power reactors. A cumulative list of RCF Sharing events is attached (Attachment A).

License maintenance training for the RCF continues.

The technical specifications, App. A to USNRC License CX-22 require reporting the following operational items:

1. Changes to the facility design: None
2. Significant maintenance, repairs and other work performed on RCF systems as follows:
 - a. Janusry 16,2002 Deck area monitor malfunction repaired.
 - b. June 19, 2001 LP2 trip to solenoid interrupt circuit malfunction corrected.
3. Changes in Operating Procedures which relate to the safety of RCF operations: None
4. Surveillance checks, tests, and calibrations were conducted and logged as required. The results were satisfactory. On May 24, 2002 an emergency preparedness drill was conducted at the RCF.
5. Changes, tests or experiments requiring authorization from the USNRC under 10CFR50.59 a or b: None
6. Timothy Trumbull has been Operations Supervisor through this period.
7. Calculated integrated thermal power: Approximately .003 kwhr/yr, far less than the Tech Spec 3.1.10 limit of 200 kwhr/yr.
8. There was one unplanned scram in the report interval: On 03/10/02 at 1145AM an unplanned scram was induced in LP2, apparently by an electrical transient. The LP2 scram was reset and no further problem occurred.
9. Maintenance operations were carried out and logged with satisfactory results.
10. The enviromental monitoring program yielded the following summary of TLD doses taken at the exclusion area boundary and the site boundary for this report period: All were within limits.

Station	Dose (mRem)
1 Exclusion Area Boundary	Rad. Safety Office
2 Exclusion Area Boundary	"
3 Exclusion Area Boundary	"
4 Exclusion Area Boundary	"
5 Site Boundary	"

- 6 Site Boundary "
- 7 Control (Public Safety Office) "

11. Facility personnel exposures were all less than 100 mRem for the report period.

Sincerely,

Dr. Donald R. Harris, Director
RPI Reactor Critical Facility (RCF)

Attachment A

Reactor Sharing Events. September 1990-May 2002.

Date	Visitor	# of students
09/29/90	Troy High School	30
03/06/91	U.S. Navy	6
04/16/92	West Point	11
05/01/91	U.S. Military Academy	13
05/08/91	Amsterdam High School	21
05/21/91	Troy High School	17
05/28/91	Burnt Hills High School	16
08/02/91	Oneonta	25
02/28/92	Adirondack Community College	9
03/04/92	Fulton Montgomery Community College	11
03/27/92	Amsterdam High School	15
05/12/92	Stillwater High School	14
05/12/92	Williams College	13
05/18/92	Guilderland High School	45
05/19/92	Guilderland High School	45
05/20/92	Guilderland High School	60
08/04/92	Oneonta	26
03/27/93	ANS North Eastern Student Conference	28
05/06/93	Vermont Tech	6
12/03/93	Adirondack Community College	28
05/06/93	Boy Scouts of America	25
05/03/94	Vermont Tech	9
05/05/94	State University of NY at Delhi	9
10/29/94	ANS Secondary School Teachers	35
03/02/95	Duanesburg Central School	45
03/03/95	Duanesburg Central School	38

05/05/95	Bethlehem Central High School	23
05/09/95	Vermont Tech	7
11/06/95	U.S. Military Academy	32
03/15/96	Schenectady Fire Department	25
05/07/96	Vermont Tech	9
03/03/97	Bethlehem Central High School	24
05/01/97	Vermont Tech	10
04/06/98	Albany Academy	6
05/05/98	Vermont Tech	8
05/12/98	Guilderland High School	92
05/13/98	Guilderland High School	85
09/06/00	Vermont Tech	9
10/28/01	RPI Group	5
05/29/01	Vermont Tech	9
11/06/01	Scout Troop	18
03/13/02	Emma Willard School	63
05/16/02	RPI Group	16
	Total to date	1036